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NEW LITERATURE.

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BY W. A. KELLERMAN.

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FARLOW, W. G.—“Notes on some species of *Gymnosporangium* and *Chrysomyxa* of the United States;” in proceedings of the American Academy of Arts and Sciences, communicated Feb. 11th, 1885.

Dr. Farlow gave an account, in a paper on “The *Gymnosporangia* of the United States,” published in the anniversary Memoirs of the Boston Society of Natural History in 1880, of his unsuccessful attempts to show, by means of cultures, the relationship of the *Gymnosporangia* to the forms of *Rastelia* growing near Boston. The present paper details continued and more extensive experiments of a similar character made in May and June, 1883. “The method of culture employed was the following: Specimens of different species of *Gymnosporangium* were gathered early in May, before the spores had begun to germinate, and while the spore masses were flat and not swollen into gelatinous protuberances, as is the case when they are moistened by showers. The specimens were then placed in watch-glasses under moistened glasses, each species by itself, when the spore masses soon expanded, and the spores began to germinate. It was in this way easy to arrange so that the spores of the different species were kept pure,—a fact confirmed by microscopic examination. As the spores germinated, the sporidia, of a bright orange color, dropped into the moist watch-glasses, and were used at once for infecting the desired plants. Two kinds of material were used. The first consisted of leaves of different *Pomaceæ*, which were freshly gathered in the Botanic Garden of Cambridge, and at a distance from any species of *Juniperus* which could have been infested by a *Gymnosporangium*. The leaves were placed on moistened glass slides, and arranged on zinc stands under bell-glasses. The sporidia were then carefully dropped upon the leaves, which were immediately covered by a bell-glass. The leaves under each glass were sown with the sporidia of but one species, and subsequently, when it was necessary to remoisten the slides, the bell-glasses were removed for a moment only, and at no time were the leaves under more than one bell-glass exposed. I also used a number of small seedlings of *Pomaceæ*, each pot being covered by a glass receiver. The seedlings were supposed to be in a healthy condition, but, to serve as a check, a number of similar seedlings were kept on which no sporidia were sown. The young plants were inoculated, either by dropping the sporidia upon them, or, in cases where the leaves were not in such a position to retain drops well, small pieces of the gelatinous spore masses were placed on them, it first being ascertained that the spores had begun to germinate. After three or four days it was necessary to remove the remains of the gelatinous masses in order to prevent moulding. After the lapse of a week, at which period the germinal

tubes, if ever, must have made their way into the leaves, I attempted in a few cases to remove the glass receivers and continue the cultures in the open air. This, however, was impossible, for the plants wilted to such an extent that I was obliged to keep them constantly covered. European experimenters usually expose their cultures to the air after a few days, but it is doubtful whether this can be done in our climate except in the most favorable cases, so great and sudden are the changes of moisture and temperature." The results are summarized as follows:

*Spermogonia* appeared after sowing the sporidia of

*G. fuscum* var. *globosum* on seedling apples, on *Crataegus oxyacantha* (very abundant), on *C. Douglasii*, and on apple leaves under bell-glass. In cultures of previous years, also on *C. tomentosa*.

*G. macropus* on apple seedlings, on *C. Douglasii*, and on shoots of *Pyrus arbutifolia* and *Amelanchier*. Also in previous cultures on *C. tomentosa* and *Amelanchier*.

*G. clavipes* on apple seedlings and shoots of *Pyrus arbutifolia* and *Amelanchier*.

*G. biseptatum* on *Amelanchier* leaves and shoots, and previously on *C. tomentosa*.

It will be noticed that *Spermogonia* were produced, but no *Aecidia* appeared, and "in the absence of *Aecidia*, can we infer anything from the *Spermogonia*?" After discussing in detail the experiments with the different species on the different host-plants, Dr. Farlow gives the following as the conclusions to be drawn:

1. The æcidium of *G. biseptatum* is probably *Ræstelia botryapites*.
2. The æcidium of *G. globosum*, to be kept distinct from *G. fuscum*, is possibly *Ræstelia aurantiaca*.
3. The æcidium of *G. macropus* is to be sought among the *Ræstelia* growing especially on apples and *Amelanchier*.

The remaining three pages of the paper refer to species of *Chrysomyxa* found by himself and Mr. Edwin Faxon in the White Mountains. On the upper surface of leaves of *Ledum* a form was found undistinguishable from the teleutosporic condition of *Chrysomyxa Ledi* (A. & S.). "The spores were produced in small numbers in chains, but at maturity become free, and were then globose or broadly elliptic, measuring 24—38 x 20—26  $\mu$ ." Besides this epiphyllous form, which was decided to be *Uredo ledicola*, Peck, a hypophyllous form was found whose spores "were distinctly narrower and more acutely elliptical, measuring 24—31 x 12—19  $\mu$ , and the epispore was less rough." Dr. Farlow says "there can be no doubt that the hypophyllous form is the uredo of *Chrysomyxa Ledi*," and then adds: "Whether our epiphyllous form should be considered distinct from the hypophyllous must, for the present, remain uncertain. I found the differences stated above constant in all the specimens I examined, and they were not few in number. It may be that the two forms are modifications of the same species depending on the different structure of the upper and under side of the leaves, but the differences are cer-

tainly greater than those of many forms which are regarded as distinct by good mycologists. It is, in all events, interesting to know that we have in the White Mountains both the uredo and teleutosporic forms of *Chrysomyxa Ledi* growing in close proximity to *Abies nigra* in regions where it is badly infested with a *Peridermium* which, as stated in my paper already referred to, I am unable to distinguish from *P. abietinum*, one form of which is said by De Bary, in his exhaustive paper on the subject, to be the æcidium of *Chrysomyxa Ledi*." On *Abies Canadensis*, Mr. A. B. Seymour found, in Massachusetts, a *Cæoma*, whose scarcely ripe spores were smaller than in *C. Abietis-pectinata*, Rees, and which Dr. Farlow designates. "until more exact information can be obtained," as *C. Abietis-Canadensis*.

ARTHUR, J. C.—"Preliminary List of Iowa Uredineæ," in Bulletin of the Iowa Agricultural College, issued by the Department of Botany, Nov. 1884.

The list contains the names, in alphabetical order and with host-plants, of 134 species collected by Messrs. Arthur, Holway and Bessey. The genera represented and the number of species are the following: *Uromyces*, 19; *Puccinia*, 48; *Phragmidium*, 4; *Gymnosporangium*, 3; *Melampsora*, 2; *Coleosporium*, 2; *Chrysomyxa*, 1; *Uredo*, 4; *Cæoma*, 1; *Æcidium*, 48; *Ræstelia*, 2. The new species are as follows: *Uromyces Rudbeckiæ*, Arthur & Holway, on *R. laciniata*; *Puccinia Cypripedii*, Arthur & Holway, on *C. pubescens*; *P. Eleocharis*, Arthur, on *E. intermedia* and *E. palustris*; *P. Sporoboli*, Arthur, on *S. heterolepus*; *P. Stipæ*, Arthur, on *S. spartea*; *Phragmidium gracile* (Farlow), *P. incrasatum* Lk. var. *gracile*, Far., in Ellis' N. A. F., 282, on *Rubus strigosus*; *Coleosporium Viburni*, Arthur, on *V. Lentago*; *Uredo Boutelouæ*, Arthur, on *B. racemosa*; *Æcidium Napææ*, Arthur & Holway, on *N. dioica*.

CRAIN, F. W.—"Lower Fungi of Kansas;" in Bulletin Washburn College of Nat. Hist., I, p. 62.

A list of 68 identified species, with descriptions of the following:

*RHINOTRICHUM PULVERACEUM*, Ellis in litt.—On dead wood and bark, Topeka. Winter. Occuring with *Torula binale*, C. & E. Forming a thin, pale yellowish white, subgranulose layer on the matrix; hyphæ much branched, the ends swollen and smooth; the conidia (appearing at first inside these swollen ends and pushing out through the investing membrane?) variable in size and shape, globose, 5—9  $\mu$  in diameter, or elliptical, 5—12 x 5—7  $\mu$ ; the elliptical conidia mostly with a slight apiculus at one end. The branching hyphæ are sparingly septate and mostly not over 3  $\mu$  in diameter. Peculiar in the smooth, swollen tips. The sterile hyphæ from a thin, white, soft layer like a *Corticium* on the surface of the wood.

*PEZIZA CRAGINIANA*, E. & E., in litt. On very rotten wood, Topeka, May. Stipitate, 2—3 mm. in diameter, smooth, discoid, pale waxy-white when fresh, darker when drv: stem filiform, 5—3 mm. long; asci cylindrical, 75 x 6  $\mu$ , sessile or nearly so; paraphyses linear, rather stout, often branched above, but scarcely thickened; sporidia ovate-elliptical, hyaline (yellow in the asci), 2-nucleate, 5—6 x 2½—3  $\mu$ , uniseriate or sometimes biseriate. Allied to *P. gracilipes*, Cke.

*PEZIZA HEMISPHERICA*, Wigg., in litt. var. *SUBCALVA*, Ell.—Differs from typical *hemispherica* chiefly in the possession of a rather sparing hairy coat. On damp ground in woods, Topeka, June and July.